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EXAMINER	
TRAN, THANH Y	

ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/684,124	DIXON, DUANE	
	Examiner	Art Unit	
	Thanh Y. Tran	2827	AU

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pao (U.S. 5,386,343) in view of Cnyrim et al (U.S. 4,959,750).

With respect to claim 1, Pao teaches a method for mounting a lead frame to a circuit board having a first and second side (see Fig. 1), the lead frame (comprising elements 26 and 28) having leads (28) with a lead solder area (32) for contact with solder material on the circuit board (10) (see Figs 1 and 3, col. 4, lines 56-61), the method comprising: first reflow soldering of the lead frame (see solder joint 32 in figure 1) and a first set of electrical components (20) on the first side of the circuit board (10) (see Figs. 1 and 3; col. 4, lines 56-61, and col. 5, lines 37-49).

Pao does not teach the method comprising: inverting the circuit board; and second reflow soldering of a second set of electrical components on the second surface of the circuit board. Cnyrim et al teaches a circuit board (1, Fig. 1) comprising reflow soldering (see solder joints 11) of a second set of electrical components (2, 3, 4, 8, 9 and 10) on the second surface of the circuit board (1). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Pao by adding a second reflow soldering of a second set of electrical components on the second surface of the circuit board as

taught by Cnyrim et al for the purpose of providing easy mounts of electronic components on circuit board and improving the electrical surface-mounted technology.

With respect to claim 2, Pao does not teach the method wherein the ratio of the weight of the frame to the lead solder area is less than about 30 grams per square inch. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to apply a rule of using less than about 30 grams per square inch for a frame in the reference of Pao, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With respect to claim 3, Pao teaches, in figure 1, the first set of electrical components (20) includes low-profile electrical components.

With respect to claim 4, Pao teaches, in figure 1, the lead frame (comprising elements 26 and 28) is formed of a dielectric material with metal leads (see Fig. 1, elements 26 and 28). It should be noted that: the lead frame is inherently formed of a dielectric material (which is included in upper circuit component 26).

With respect to claim 5, figure 1 of Pao shows that the lead frame has a hub.

With respect to claim 6, Pao teaches that each of the electrical components (see Fig. 1, elements 26, 20) of the first set have a ratio of weight to solder area such that they are held in contact with the circuit board (10).

With respect to claim 7, Pao does not teach the attaching the first set of electrical components with an adhesive prior to the first reflow soldering. The Examiner takes Official Notice that it is known to use a method of attaching the electrical components with an adhesive prior to the reflow soldering. Thus, it would have been obvious to a person having ordinary skill

in the art at the time the invention was made to modify the device of Pao by including a method of attaching the first set of electrical components with an adhesive prior to the first reflow soldering for the purpose of securing or retaining electrical components on circuit board before soldering.

With respect to claim 8, Pao does not teach that the circuit board comprises FR-4 material. However, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use FR-4 material for making of a circuit board in the prior art of Pao for the purpose of reducing the production costs, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With respect to claim 9, figure 1 of Pao shows that lead frame (comprising elements 26 and 28) is *substantially* rigid.

With respect to claim 10, figures 1 and 3 of Pao show that leads (28) of the lead frame are substantially coplanar.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 11-21 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pao (U.S. 5,386,343) in view of Griffin (U.S. 5,689,600).

With respect to claims 11 and 30, Pao teaches a method for assembling a surface mount device, the method comprising: providing a circuit board having a first and second side (see Fig. 1) and a plurality of pads (18, 30) for electrical connections on the first side, applying a first mount of solder material (24, 32) on the plurality of pads of the first side; positioning a first set of electrical components (26, 20) on the first side of circuit board (10) in contact with solder material (see elements 32, 24); positioning a lead frame (comprising elements 26 and 28) having leads (28) so that lead frame is adjacent to the first side of circuit board (10) and leads are in contact with solder material over a lead solder area (32, 24) (see Figs. 1 and 3; col. 4, lines 56-61, and col. 5, lines 37-49); wherein a ratio of the weight of the frame (comprising elements 26 and 28) to the lead solder area (32) is such that the lead frame stays connected to the first side of circuit board (10). Pao does not teach the method comprising: inverting the circuit board; and applying a second amount of solder material on the plurality of pads of the second side of the circuit board; positioning a second set of electrical components on the second side of the circuit board in contact with the solder material; and second reflow soldering with the second side of the circuit board. Griffin teaches a circuit board (12, Fig. 2C) comprising: applying a mount of solder material on the plurality of pads (20) of the second side of the circuit board (12); positioning a set of electrical components (14) on the second side of the circuit board (12) in contact with solder material; and second reflow soldering with the second side of the circuit board (12) (see col. 4, lines 55-60). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Pao by applying a mount of solder material on the plurality of pads of the second side of the circuit board; positioning a set of electrical components on the second side of the circuit board in

contact with solder material; and second reflow soldering with the second side of the circuit board as taught by Griffin for the purpose of providing easy mounts of electronic components on circuit board and improving the electrical surface-mounted technology.

Claim 12 recites limitations similar to claim 2. Thus, it is rejected for the same reasons.

Claim 13 recites limitations similar to claim 3. Thus, it is rejected for the same reasons.

Claim 14 recites limitations similar to claim 4. Thus, it is rejected for the same reasons.

Claim 15 recites limitations similar to claim 5. Thus, it is rejected for the same reasons.

Claim 16 recites limitations similar to claim 6. Thus, it is rejected for the same reasons.

Claim 17 recites limitations similar to claim 7. Thus, it is rejected for the same reasons.

Claim 18 recites limitations similar to claim 8. Thus, it is rejected for the same reasons.

Claim 19 recites limitations similar to claim 9. Thus, it is rejected for the same reasons.

Claim 20 recites limitations similar to claim 10. Thus, it is rejected for the same reasons.

With respect to claim 21, figure 1 of Pao shows the lead frame (comprising elements 26 and 28) is positioned on and in contact with the first side of the circuit board (10).

Response to Arguments

5. Applicant's arguments filed 11/12/03 have been fully considered but they are not persuasive.

First, Applicant argued that Pao and Cnyrim fail to teach or suggest "a circuit board having a first and second side and a plurality of pads for electrical connections on each of the first and second sides".

In response to Applicant arguments, the recitation "a circuit board having a first side and second side and a plurality of pads for electrical connections on each of the first and second sides" that has not been given patentable weight because it has been held that a preamble is denied the effect of a limitation where the claim is drawn to a structure and the portion of the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. Kropa v. Robie, 88 USPQ 478 (CCPA 1951). Thus, claim 1 including the above recitation is "read on" the reference of Pao (U.S. 5,386,343) and Cnyrim et al (U.S. 4,959,750).

Second, Applicant argued that Pao and Cnyrim et al fail to teach the method for inverting the circuit board and performing a second reflow soldering to attach a second set of components.

The Examiner disagrees because the combination of the references of Pao and Cnyrim et al teach the above limitation. Pao teaches a first soldering reflow (see the solder joints 24 and 32 as shown in figure 1) on the first surface of the printed circuit board (10) to attach a first set of components (20). Cnyrim et al teaches a second soldering reflow (see the solder joints 11 as shown in figure 1) on the second surface of the printed circuit board (1) to attach a second set of components (2, 3, 4, 8, 9 and 10). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the device and the corresponding method of Pao by inverting the circuit board and applying the second soldering reflow for attaching the second set of components to the printed circuit board as taught by Cnyrim et al for the purpose of improving the surface mount technology.

Finally, Applicant argued that the teaching of Pao militate against any motivation to modify Pao to include the steps of inverting the circuit board and then reflow soldering a second set of components to the second surface with the circuit board inverted.

The Examiner disagrees because the combination of the references of Pao and Griffin teach the step of second reflow soldering for soldering a second set of components to the second surface within the circuit board thereby inverting the circuit board. Pao teaches a first soldering reflow (see the solder joints 24 and 32 as shown in figure 1) on the first surface of the printed circuit board (10) to attach a first set of components (20). Griffin teaches a second soldering reflow, on the second surface of the printed circuit board (12, Fig. 2C) (see col. 4, lines 55-60), for attaching a second set of components (see the components having leads 18 as shown on the second surface of the circuit board 12). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the device and the corresponding method of Pao by inverting the circuit board and applying the second soldering reflow for soldering the plurality of pads, on the second surface of the printed circuit board, and second set of components as taught by Griffin for the purpose of improving the surface mount technology.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hashimoto et al (U.S. 5,821,614) teaches A card Type Semiconductor Device comprising a main circuit board having a first and second mount surfaces.

Wu et al (U.S. 5,191,404) teaches High Density Memory Array Packaging comprising a circuit board having a first and second mount surfaces.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on Monday through Thursday and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo, can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3431.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TYT

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